

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460



OFFICE OF PREVENTION, PESTICIDES AND TOXIC SUBSTANCES

DP BARCODE: D311975

MEMORANDUM

**SUBJECT:** Washington State Department of Agriculture and Oregon Department of Agriculture Request a Regional Emergency Specific Exemption for the Use of Mancozeb to Control Leaf and Stem Blights on Ginseng. (Chemical No. 014504)

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**THRU:** Mah T. Shamim, Ph.D., Chief *M. Shamim 7/12/05*  
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**TO:** Dan Rosenblatt, PM 05 and  
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**I. Summary of Conclusions**

Mancozeb and its degradate ethylene thiourea (ETU) exceed EFED's Levels of Concern (LOCs) for: mancozeb's chronic risk to birds; mancozeb and ETU's chronic risk to mammals; mancozeb's acute risk to freshwater fish, freshwater invertebrates, estuarine-marine fish, estuarine-marine invertebrates, and aquatic nonvascular plants; and mancozeb's chronic risk to freshwater fish and freshwater invertebrates. EFED highlighted these exceedances in Table 2, below. Except for the potential risk to estuarine-marine invertebrates and aquatic nonvascular plants, the LOC exceedances also trigger endangered or threatened species concerns.

Mancozeb is short-lived in soil and water and would not itself be expected to remain in water long enough to reach water used for human consumption whether from surface water or groundwater. ETU, mancozeb's degradate of toxicological concern may reach both surface and groundwater under some conditions. EFED established a range of acute ETU Estimated



Drinking Water Concentrations (EDWCs) with a lower limit of 0.1 ppb (based on monitoring). EFED set the an upper limit of 25.2 ppb based on environmental fate and transport simulation modeling using the linked EPA PRZM and EXAMS models. The groundwater EDWC is 0.21 ppb (based on a targeted monitoring study) (MRID No. 46145401).

EFED isn't recommending new adjustments to label statements now.

## **II. Background**

The Washington Department of Agriculture (WSDA) and Oregon Department of Agriculture (ODA) have applied for Section 18 emergency exemptions for the use of mancozeb to control leaf and stem blights on ginseng.

Trade names (Registration Nos.):	Dow's Dithane DF Rainshield (62719-402) or Rohm & Haas' Dithane DF Agricultural Fungicide (707-180)
Common Chemical Name:	mancozeb
Formulation/Pesticide Type:	water dispersible granule/fungicide or algicide
% active ingredient:	75.0% (single active ingredient)-both products
Period of Use:	June 2, 2005 through August 10, 2005
Total Acreage Treated:	16 maximum potential acres in Western Washington (mainly Clark County) and 15 maximum potential acres in Western Oregon (that is, Lane, Linn, Marion, Polk, and Yamhill counties)

Mancozeb, under this exemption, will be applied by ground application, only, with aerial applications prohibited. In Washington, the treatment area encompasses ginseng growing fields in the Western part of Washington (mainly Clark County). Besides Clark county, there are 15 more counties in western Washington growing ginseng (Brun, 1999). However, according to the latest emergency exemption request (dated 12/27/2004) there has been a decline in the number of Washington ginseng growers from 41 in 1999 to 6 in 2003. This decline may reflect a decrease in the number of Washington ginseng growing counties listed in the Brun, 1999 crop profile. In Oregon, the ginseng treatment area includes 5 counties (that is, Lane, Linn, Marion, Polk, and Yamhill counties).

The maximum single rate of application is 1.5 ai/A. The request mentions 4 applications as a baseline with subsequent applications applied at a minimum 7-day application interval. The maximum seasonal use rate is 6.0 lbs ai/A with 96 lbs ai as the total allowable amount applied to the maximum potential 16 acres in Washington. In Oregon, the maximum seasonal use rate is 6.0 lbs ai/A with 90 lbs ai as the total allowable amount applied to the maximum potential 15 acres.

## **III. Environmental Fate Summary**

*Parent mancozeb* (complete polymeric chains) is non-persistent in most of the natural environments as it is expected to decompose rapidly (reach <10% of the applied within 3 days) by hydrolytic reactions. Initial hydrolytic decomposition of mancozeb appears to be a complex process and may involve its breakdown into variable/low molecular weight polymeric chains (i.e. polymer fragments), monomeric species and EBDC ligand in association with metal ions. The rate of *Parent mancozeb* hydrolytic decomposition appears to increase with particle size reduction of the applied parent and availability of moisture, oxygen, and presence of high acidic and neutral conditions. The final product of hydrolytic decomposition of *Parent mancozeb* in water/soil pore water is a multi species residue referred to as the "*mancozeb complex*". *Parent mancozeb* is not expected to partition into the air from soil and water surfaces due to low vapor pressure and low Henry's Law constant. Low  $K_{ow}$  values are reported for mancozeb, therefore the chemical will not be significantly bio-concentrated by aquatic organisms such as fish.

In contrast, *mancozeb complex* consists of transient species and degradates including the degrade of concern, ETU and its degradates. In aqueous media, transient species are short-lived while ETU is persistent; unless it is subjected to rapid degradation by microbes and/or indirect photolysis. In soils/sediments, a significant portion of the complex partitions into the soil/sediment particles (reached 55 to 70% of the applied parent within one week). In these systems, species identified in the liquid/extractable phase were similar in identity (differ in concentration) to those identified in aqueous media. Species bound to soil/sediment were poorly characterized. *Mancozeb complex* species in association with soil/sediment, appear to biodegrade at a very slow rate producing mancozeb degradates including ETU (half-lives range of 121 to 198 days in four aerobic soils). Residue species left in the liquid phase may continue to be affected by hydrolytic decomposition along with microbial activity producing degradates including ETU. Based on submitted fate data, most of the constituents of this complex are immobile and highly persistent in the environment, with aerobic soil metabolism being the major route of its slow dissipation. As mancozeb and its complex dissipate in aquatic and soil systems, degradation products are produced including ETU.

The main processes involved in the fate of resultant *mancozeb complex* in the environment is its strong affinity for adsorption to the soil followed by limited biotic degradation. Because of biodegradation, EFED expects slow and continuous release of transient species and degradates including ETU to occur overtime in the soil. EFED expects mobility of *mancozeb complex* in the natural environment to be limited because of its strong affinity to adsorption. In contrast, EFED predicts the degrade of concern (ETU) will be susceptible to leaching because of its high solubility and mobility. In the soil environment ETU lacks stability which can limit its leaching, however, its slow and steady formation from *mancozeb complex* can overcome the lack of stability and make it available for leaching. In addition, ETU has a high potential to be transported with water because of its low affinity for organic matter and high water solubility (20,000 ppm). Therefore, ETU has a high potential to move downward in the soil.

#### IV. Water Resource Summary

## A. Surface Water

### 1. Ecological exposure

Because reliable monitoring data from field locations are not available for mancozeb, EFED based the surface water exposure Expected Environmental Concentrations (EECs) of *mancozeb complex* on screening models. When a pesticide's proposed use pattern exceeds acute or chronic risks to aquatic organisms from Tier I modeling (GENEEC), EFED usually performs Tier II modeling (PRZM/EXAMS) to provide a more refined estimate of EECs. However for ginseng, a scenario for Tier II modeling does not yet exist. Because of this, EFED based EECs for *mancozeb complex* from mancozeb's proposed ginseng use on Tier I modeling (see Table 1).

### 2. Drinking water

Mancozeb is short-lived in water and would not itself reach water used for human consumption whether from surface water or groundwater. ETU, mancozeb's degradate of toxicological concern may reach both surface and groundwater under some conditions. This assessment addresses drinking water exposure to ETU only and is based on a monitoring study (MRID No. 46145401). The EBDC Task Force<sup>1</sup> conducted the monitoring program from 2001-2003. In this program, raw and associated treated surface water were sampled every two weeks during the three months historical EBDC-application season and quarterly for the remaining three quarters of each year for two years (18 sampling events). Twenty-two sites were chosen to represent vulnerable and high historic EBDC-use sites. The sites chosen were Maine (5 sites/potatoes), New York (5 sites/apples), Michigan (total= 6 sites: 3 sites/apples and 3 sites/mixed grapes/apples & nursery plants), Minnesota (2 sites/potatoes), and Washington (4 sites/apples). In two years of sampling at sites selected to be the most vulnerable nationally, no concentration values were measured above the method detection limit for ETU of **0.1 ppb**. EFED believes the sampling confirms long-term average chronic values above the detection limit will not occur. EFED used the results from this targeted monitoring program to assign the chronic and the lower limit of the acute EDWCs for drinking water from surface water. Samples were taken every 14 days during the application season and acute values may have been missed. Because of this, EFED performed PRZM/EXAMS simulation modeling for 22 crop scenarios. EFED considered the use patterns for all EBDCs and chose the highest application rate/lowest application intervals for modeling. Results showed the highest one-in-ten year acute surface water EDWC was found to be **25.2 ppb**. Therefore, EFED established a **range of acute EDWCs with a lower limit based on monitoring and an upper limit based on environmental fate and transport simulation modeling** using the linked EPA PRZM and EXAMS models. EFED, therefore, used a combined approach to exposure assessment based on both targeted surface water monitoring and computer simulation to bracket the expected acute exposure level.

EFED has been unable to locate other surface water monitoring data for the EBDC fungicides or

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<sup>1</sup> A group comprised of basic manufacturers for the ethylene bisdithiocarbamates (EBDCs) supporting the continue registration of the EBDCs, (mancozeb, metiram and maneb).

for ETU. These chemicals were not included in the US Geological Survey NAWQA<sup>2</sup> sampling program because the test methods are incompatible with the methods used by that program. NAWQA measurements are frequently the best national source of pesticide monitoring data. The USGS is currently planning to begin method development and limited EBDC/ETU monitoring in late 2004.

## B. Ground Water

The groundwater EDWC concentration is **0.21 ppb**. EFED took this concentration from a community water system intake concentration. EFED's source for this value came from an EBDC targeted groundwater monitoring study conducted by the EBDC task force from 2001 to 2003 (MRID No. 46145401). It represents the highest measured value taken from a public drinking water well (sampled in Lee County, FL) during the sampling period. In this program, raw and associated treated groundwater were sampled quarterly for two years (8 sampling events). Eighty-four sites were chosen to represent high historic EBDC-use sites. Sites chosen were in Maine (7 sites/potato crop), New York (2 sites/apples), Michigan (total= 6 sites: 1 sites/apples, 4 sites mixed grapes & apples, and 1 sites/mixed potato & apples), Minnesota (3 sites/potatoes), Washington (6 sites/apples), California (total= 25 sites: 19 sites/almonds, 4 sites/walnuts, 1 site/almonds & walnuts, 1 site/almonds & grapes), and Florida (total= 35 sites: 13 sites/tomatoes & watermelon, 10 sites/nursery plants & peppers, 6 sites/tomatoes & peppers, 3 sites/tomatoes, 2 sites/potatoes & tomatoes, and 1 site/potatoes). ETU was detected above the detection limit intermittently in only the raw water from two Florida ground water sites. No detection was observed for treated water in any of the 84 community water sites; including those two where ETU was detected in the raw water.

## C. Drinking Water Concentrations Recommendation

This assessment addresses exposure to ETU only. The **chronic** Estimated Drinking Water Concentrations (EDWC) for surface water is **0.1 ppb**. EFED based this value on a monitoring study (MRID No. 46145401) conducted by the EBDC Task Force. EFED fixed a **range of acute EDWCs with a lower limit of 0.1 ppb** (based on monitoring) and **an upper limit of 25.2 ppb** (based on environmental fate and transport simulation modeling using the linked EPA PRZM and EXAMS models). The **groundwater EDWC is 0.21 ppb** (based on a targeted monitoring study MRID No. 46145401). These surface and groundwater values represent upper-bound conservative estimates of the total ETU residual concentrations that might be found in surface water and groundwater from the use of the mancozeb on ginseng in this proposed emergency use.

ETU is not regulated under the Safe Drinking Water Act with no established Maximum Contaminant Level (MCL). However, since ETU is a B2 carcinogen, EPA's Office of Water set drinking water health advisories. Concentration values were set at 15 µg/l (ppb) in Florida and 3

µg/l (ppb) in Maine<sup>3</sup>.

**Table 1: Expected environmental concentrations (EECs) for Mancozeb's Proposed Emergency Use on Ginseng in Washington - Inputs/Outputs**

	Mancozeb (014504)	Reference
Site	ginseng	WSDA proposed emergency use
Maximum application rate (lb ai/A)	1.5	WSDA proposed emergency use
Maximum number of applications (per year)	4	WSDA proposed emergency use
Minimum interval between applications (days)	7	WSDA proposed emergency use
Percent Crop Area Factor	not applicable	not applicable
Koc value (L/kg)	1167	MRID # 40588302
Aerobic soil metabolism half-life (days)	157	MRID # 45744501
Is this pesticide to be wetted-in? (Yes/No)	No	WSDA proposed emergency use
Application method equipment	Ground	WSDA proposed emergency use
Low (< 20 in.) or High (>20 in. boom sprayer)	High	EFED default
Droplet size distribution	Fine	EFED default
Width of the no-spray zone (feet)	0	EFED default
Application method type/incorporation depth (inches)	0	WSDA proposed emergency use
Water solubility (ppm) (Note: the dissolved pesticide concentration in a water body cannot exceed the solubility of the chemical) (pH 7.5)	6.2	MRID # 41841901
Aerobic aquatic metabolism half-life (days)	0 (stable)	EFED default no data
Hydrolysis half-life (days) (pH 7)	0.7	MRID #s 00097162 40258201
Photolysis-water half-life (days)	0 (stable)	MRID # 00162103
peak (ppb)	104.51	GENEEC 2.0
maximum 4-day average (ppb)	55.21	GENEEC 2.0
maximum 21-day average (ppb)	11.84	GENEEC 2.0
maximum 60-day average (ppb)	4.15	GENEEC 2.0
maximum 90-day average (ppb)	2.76	GENEEC 2.0
annual average (ppb)	not applicable	not applicable

## V. Aquatic Organisms Risk Assessment

<sup>3</sup> USEPA/Office of Water 1993. Federal-State Toxicology and Risk Analysis Committee (FSTRAC). Summary of State and Federal Drinking Water Standards and Guidelines.

There are potential acute and chronic risks to freshwater fish and invertebrates; acute risks to estuarine/marine fish and invertebrates; and acute risks to nonvascular aquatic plants for mancozeb's modeled use on ginseng. The acute RQ exceeding freshwater fish endangered species LOC for mancozeb is 0.23. The chronic RQ exceeding the LOC for freshwater fish is 1.89. EFED based chronic freshwater fish effects on reduced survival and lack of growth effects in fathead minnows. The acute freshwater invertebrates' RQ exceeding the endangered species LOC is 0.18 with the chronic RQ exceeded at 1.62. Chronic freshwater invertebrate effects were due to immobility, length and time until first brood in daphnia. The acute estuarine/marine fish RQ at 0.07 exceeds the endangered species LOC. The estuarine/marine invertebrate acute RQ at 9.95 exceeds all LOCs making estuarine/marine invertebrates the most sensitive aquatic taxa to mancozeb's use on ginseng. EFED did not assess potential chronic risks to estuarine/marine fish and invertebrates due to lack of data. Based on data for one surrogate species, mancozeb's use on ginseng exceeds the acute risk LOC for nonvascular aquatic plants with an acute RQ of 2.22.

Mancozeb, unlike most pesticide active ingredients is not a well-defined monomeric substance but is a polymeric compound and is nearly insoluble in water with a high affinity to adsorption by soil/sediment particles. The mancozeb portion that dissolves in water, completely, decomposes into a suite of transient species and degradates (that is, *mancozeb complex*) and is no longer the parent material by itself. Over time ETU is an important transformation product of mancozeb. The toxicity to aquatic organisms is an estimate of the *mancozeb complex* concentration responsible for the effect ( $LC_{50}$ s,  $EC_{50}$ s, and NOAECs). EFED ascertained these toxicity values from the various mancozeb aquatic toxicological studies. EFED used these values to calculate Risk Quotients (RQs). The modeling EECs are based on *mancozeb complex* estimates. These toxicity endpoints are based on measured concentrations as opposed to nominal concentrations.

*Mancozeb complex* is highly toxic to cold water (freshwater) fish and freshwater invertebrates. *Mancozeb complex* is moderately toxic to warm water (freshwater) and estuarine/marine fish. *Mancozeb complex* is moderately to very highly toxic to estuarine/marine invertebrates and toxic to freshwater nonvascular plants. The chronic *mancozeb complex* exposure LOCs for freshwater fish and freshwater invertebrates are exceeded. No acceptable data has been presented to assess the chronic effects of *mancozeb complex* to estuarine/marine fish or estuarine/marine invertebrates. No sediment toxicity data has been submitted for mancozeb. EFED needs whole sediment acute toxicity testing on freshwater invertebrates because *mancozeb complex* is toxic to aquatic invertebrates, binds to sediment, and may persist on sediment surfaces. There has been no data filed to evaluate the acute effects *mancozeb complex* has on the following aquatic plant test species: duckweed (*Lemna gibba*), marine diatom (*Skeletonema costatum*), blue-green algae (*Anabaena flos-aquae*), and a freshwater diatom.

Based on acute exposure from core studies, ETU is practically nontoxic to cold water fish and slightly toxic to freshwater invertebrates. ETU RQs for freshwater fish, freshwater invertebrates and aquatic nonvascular plants are below LOCs. Based on laboratory data and modeled EECs, the *mancozeb complex* is responsible for exceeding LOCs and not the common degrade, ETU. This means the *mancozeb complex*, other than ETU, is responsible for the acute toxicity to freshwater fish, freshwater invertebrates, and nonvascular aquatic plants. EFED has not

reviewed any chronic toxicity data to determine ETU's chronic toxicity to aquatic animals. EFED needs core studies to evaluate the acute risks to estuarine and marine organisms for ETU.

What effect does EFED expect *mancozeb complex* to have on non-target aquatic species? EFED expects mancozeb to reach aquatic environments through drift and runoff. Mancozeb has low solubility in water (6-20 ppm) but EFED expects it to decompose rather quickly, by hydrolytic reactions, into a multispecies residue (*mancozeb complex*) consisting of transient species and degradates including the degrade of concern ETU. Once mancozeb reaches the aquatic environment EFED believes the *mancozeb complex* will be the portion of the mancozeb that is available to aquatic organisms. EFED expects most of the transient species present in the *mancozeb complex* to partition into the sediment particles with varied strength of bonding. Over time ETU is an important transformation product of the *mancozeb complex*. In aqueous media, transient species do not last long while ETU is persistent unless ETU is subjected to rapid degradation by microbes and/or indirect photolysis.

The Ecological Incident Information System (EIIS) (US EPA, 1994) reported mancozeb in three fish kill incidents. One incident occurred in 1970, another in 1992 and the latest occurred in 1995. In the 1970 and 1992 incidents, mancozeb had been applied with insecticides highly toxic to fish (thiodan and endosulfan) and, because of sample analysis, EFED classified mancozeb as unlikely to have been responsible for the these fish kills. The third incident in 1995 involved an accidental mancozeb spill into a stream that was the source water for a salmon hatchery which resulted in a fish kill at the salmon hatchery. Although no samples were analyzed (fish or water), EFED considered mancozeb to be a probable cause to the kill.

Mancozeb first registration occurred in the early 1980s. Mancozeb has long past use record with a small number of incidents reported. Because of this, EFED expects there is a low chance mancozeb's proposed use on ginseng will result in acute toxicity to freshwater fish, freshwater invertebrates, or estuarine/marine fish. Due to *mancozeb complex's* high acute toxicity to estuarine/marine invertebrates and freshwater nonvascular plants, EFED expects the chance of adverse effects to these taxa will be greater should exposure occur. However, this emergency use is limited in: 1) application method (ground, only); 2) size (31 acres or less); 3) time (proposed use period: 6/2/05 through 8/10/05); and 4) scope [restricted primarily to one county in western Washington (Clark county) and 5 counties in Oregon]. Because of these limitations, EFED expects mancozeb's use would most likely not result in significant exposure to estuarine/marine invertebrates or freshwater nonvascular plants. In addition to these use limitations, any acute exposure to estuarine/marine invertebrates or freshwater nonvascular plants would result from drift or runoff. Although expected, drift and runoff are minimized through effective application procedures which adds another layer of safety.

The labels for this emergency use display the following: "Apply only when there is sustained wind away from fish-bearing waters or leave a 25 foot untreated buffer between [the] treatment area and fish bearing-waters." This statement may add additional safety to this proposed emergency use but was not interpreted by EFED to be an enforceable labeling statement since the use of "sustained wind away" is ambiguous.



## VI. Terrestrial Animal Risk Assessment

There are potential chronic risks to birds and mammals from mancozeb's use on ginseng. The highest avian chronic RQ is 9.47 from birds feeding on short grass. EFED based the potential bird chronic risks on reproductive effects. These effects were reductions in: egg production; early and late embryo viability; hatchability; and offspring weight at hatch and 14-days of age in mallard ducks. The highest mammalian chronic RQ is 9.86 (mammals feeding on short grass) from mancozeb exposure and an RQ of 3.6<sup>4</sup> attributed to ETU, alone. This means both mancozeb and its degradate, ETU, pose potential chronic risks to mammals. EFED based mancozeb's potential mammal chronic reproductive effects on a 2-generation study in rats. These mammal effects were parental body weight decrements, increased relative thyroid weights, and increased incidence of thyroid follicular cell hyperplasia. ETU effects triggering potential chronic risk were based on developmental defects of the brain (that is, exencephaly<sup>5</sup>, dilated ventricles, and hypoplastic cerebellum) in rats. EFED does not calculate risk quotients to conduct risk assessments on terrestrial invertebrates. Since mancozeb is practically nontoxic to honeybees (acute contact LD<sub>50</sub> > 178 µg/bee), EFED expects a low acute risk to nontarget terrestrial insects. Based on multiple active ingredient end-use product testing, EFED considers mancozeb a low potential risk to nontarget terrestrial plant species as a result of its proposed emergency use on ginseng.

The acute oral LD<sub>50</sub> was determined to be ~1500 mg/kg for the English sparrow (*Passer domesticus*) (MRID No. 00036094) and >6400 mg/kg for the mallard duck (MRID No. 00080716) and Japanese quail (*Coturnix japonica*) (MRID No. 00080717). These studies were not the standard single oral dose studies but were multiple oral dose studies that were accepted as supplemental studies in lieu of the standard testing. Therefore, mancozeb is categorized as slightly to practically nontoxic to avian species on an acute oral basis. The requirement for avian subacute dietary testing was waived. EFED waived the requirement for these studies. EFED decided these multiple dosing studies exceeded the requirements for dietary testing. The dietary testing attempted on mallard ducks and bobwhite quail showed the birds had an aversion to test diet and would not consume the test material. EFED does not have any acute, subacute or chronic toxicity data to determine ETU's toxicity to birds.

Mancozeb is practically nontoxic to small mammals on an acute oral basis with LD<sub>50</sub> > 5,000 mg/kg in tests done on laboratory rats. ETU is practically nontoxic to small mammals on an acute oral basis with LD<sub>50</sub> of 2,300 mg/kg in tests done on laboratory mice. There are no past incidents of bird or mammal poisonings from mancozeb's use in the US (US EPA, 1994). This absence of incidents combined with low toxicity leads EFED to expect a low risk from mancozeb's acute exposure to birds and mammals. EFED didn't calculate bird or mammal acute RQs for mancozeb or ETU because of these chemicals' low acute toxicity and the scarcity of past

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<sup>4</sup> This is the RQ for small mammals (15-gram) feeding on short grass.

<sup>5</sup> Lethal condition in which the skull is defective with the brain exposed or extruding.

incidents .

Mancozeb was determined to be practically nontoxic to honeybees ( $LD_{50} > 178 \mu\text{g}/\text{bee}$ ) (MRID No. 00018842). Because of this low toxicity, EFED expects mancozeb's proposed emergency use on ginseng will be a low potential risk to honeybees. Tier I plant testing for a multiple active ingredient (a 9% mancozeb and 60% dimethomorph mixture) (MRID No. 44283401) showed all plant growth inhibition was less than 25%. This result eliminated the need for Tier II terrestrial plant testing except for possible single active ingredient mancozeb end-use products. At this time, EFED considers mancozeb a low potential risk to nontarget terrestrial plant species as a result of it's proposed emergency use on ginseng.

Mancozeb's proposed emergency use on ginseng represents a potential extended chronic risk to birds and mammals. Mancozeb represents a potential reproductive risk to birds when exposed to mancozeb residues of 125 ppm or more on food items and a potential reproductive risk to mammals when exposed to 120 ppm or more on food items. As shown in Figure 1, these levels of exposure on most avian and mammalian food items are found after the first application of mancozeb to ginseng. These exposure levels continue throughout the application cycle for more than 55 days.

EFED presumes applications of the mancozeb will occur when there is heavy plant disease pressure. Heavy disease pressure to plants results when there is high moisture from rains.

These rains promote conditions for the growth and propagation of fungal species. EFED expects mancozeb applications will result in rapid degradation of mancozeb to *mancozeb complexes* including ETU on plant surfaces.

Except for applications to dry soils in dry environments, EFED expects a rapid change of mancozeb into *mancozeb complex*.<sup>6</sup> EFED expects mancozeb's and ETU's long-term or chronic effects on birds and mammals to be a high potential risk. This assumption is supported by toxicological studies and exposure estimates. EFED expects chronic problems that affect

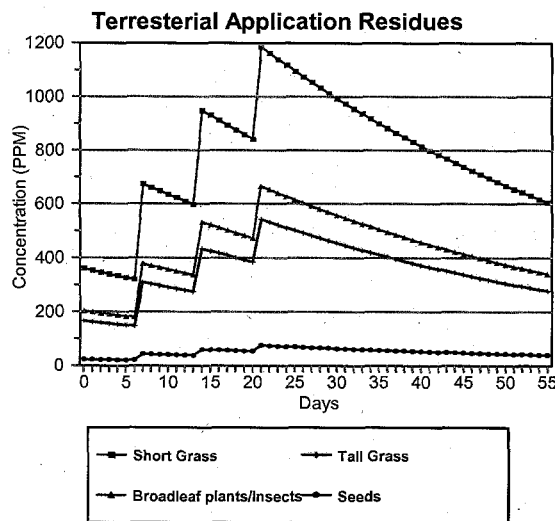


Figure 1: Mancozeb Residue from Mancozeb's Applications to Ginseng

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Dry conditions is one circumstance that may explain the high-end (> 30 days) foliar dissipation half-life values for the EBDCs in general. EFED expects differences in application methods such as application rates, differences crops such as morphology, and regional differences such as weather also affect the foliar dissipation. Another reason that may cause longer foliar dissipation half-lives is sample analysis. Measurements quantifying the foliar dissipation half-life routinely use measurements of the evolved  $\text{CS}_2$  in the headspace of a sealed vial. Such measurements quantify the sulfur from both the *parent EBDC* and the *EBDC complex* in the sample. This means the EBDC's foliar dissipation half-lives result from the presence over time of both the *parent EBDC* and the *EBDC complex*.

wildlife from the use of mancozeb would be largely unnoticed in the field and thus EFED would not expect incident reports, from adverse chronic exposure.

## VII. Risk Quotient Table

Levels of Concern Risk Quotient exceedences are highlighted in Table 2.

**Table 2: Risk Quotients for Mancozeb's Use on Ginseng  
Ground Foliar Spray; 4 Applications Every 7 Days at 1.5 lbs ai/A  
(Terrestrial EEC's Based on Fletcher's Residue and T-REX Version 1.1 Model<sup>a</sup>; Aquatic EEC's Based on  
GENEEC 2.0 Model)**

Surrogate Species	Exposure	Toxicity	Risk Quotient
Mammalian Reproduction Mancozeb NOAEL <sup>b</sup>	74 <sup>1</sup> - 1,184 <sup>2</sup> ppm	120 ppm	0.62-9.86
Mammalian Developmental ETU NOAEL <sup>c</sup>	1.18 - 18.94 mg/kg	5 mg/kg/day	0.01-3.6 <sup>3</sup>
Avian Subacute Dietary LC <sub>50</sub>	74 - 1,184 ppm	no data	not determined
Avian Reproduction NOAEL <sup>d</sup>	74 - 1,184 ppm	125 ppm	0.59-9.47
Freshwater Fish Acute Mancozeb LC <sub>50</sub> <sup>e</sup>	104.51 <sup>4</sup> ppb	460 ppb	0.23
Freshwater Fish Acute ETU LC <sub>50</sub> <sup>f</sup>	25.2 <sup>9</sup>	>502,000 ppb	below LOC
Freshwater Fish Reproduction NOAEC <sup>g</sup>	4.15 <sup>5</sup> ppb	2.19 ppb	1.89
Aquatic Invertebrate Acute Mancozeb LC <sub>50</sub> <sup>h</sup>	104.51 ppb	580 ppb	0.18
Aquatic Invertebrate Acute ETU LC <sub>50</sub> <sup>i</sup>	25.2	26,900 ppb	below LOC
Freshwater Invertebrate Reproduction NOAEC <sup>j</sup>	11.84 <sup>6</sup> ppb	7.3 ppb	1.62
Estuarine Fish Acute LC <sub>50</sub> <sup>k</sup>	104.51 ppb	1,600 ppb	0.07
Estuarine Fish Reproduction NOAEC	4.51 ppb	no data	not determined
Estuarine Invertebrate LC <sub>50</sub> <sup>1</sup>	104.51 ppb	10.5 ppb	9.95 <sup>7</sup>
Estuarine Invertebrate Reproduction NOAEC	11.84 ppb	no data	not determined
Terrestrial Plant EC25	not determined	no data	not determined
Aquatic Plant (nonvascular) Mancozeb EC <sub>50</sub> <sup>m</sup>	104.51 ppb	47 ppb	2.22 <sup>8</sup>
Aquatic Plant (nonvascular) ETU EC <sub>50</sub> <sup>n</sup>	25.2	23,000 ppb	below LOC
Aquatic Plant (vascular) EC50	104.51 ppb	no data	not determined

### Footnotes:

a Assumes degradation with a mancozeb and ETU total foliar residue half-life of 35 days and mancozeb to ETU conversion rate of 1.6%.

b MRID # 41365201 [laboratory rat (*Rattus norvegicus*)]

c MRID # 45937601 [laboratory rat (*Rattus norvegicus*)]

d MRID # 41948401 [mallard duck (*Anas platyrhynchos*)]

e MRID # 40118502 [rainbow trout (*Salmo gairdneri*)]

f MRID # 45910401 [rainbow trout (*Oncorhynchus mykiss*)]

g MRID # 43230701 [fathead minnow (*Pimephales promelas*)]

h MRID # 40118503 [water flea (*Daphnia magna*)]

i MRID # 45910402 [water flea (*Daphnia magna*)]

j MRID # 40953802 [water flea (*Daphnia magna*)]

k MRID # 41844901 [sheepshead minnow (*Cyprinodon variegatus*)]

l MRID # 41822901 [mysid shrimp (*Americamysis bahia*)]  
m MRID # 43664701 [freshwater green algae (*Selenastrum capricornutum*)]  
n MRID # 45910403 [freshwater green algae (*Pseudokirchneriella subcapitata*)]

- 1 Residue levels on seeds (15 ppm/lb ai/A)
- 2 Residue levels on short grass (240 ppm/lb ai/A)
- 3  $RQ = EEC \text{ (mg/kg)} / [NOAEL \text{ (mg/kg-bw/day)} / \%( \text{ decimal) Body Weight Consumed (bw/day)}]$
- 4 Peak water concentration
- 5 Average 60-day water concentration
- 6 Average 21-day water concentration
- 7 There are currently no estuarine/marine invertebrates listed as endangered species.
- 8 To date, there are no known nonvascular aquatic plant species on the endangered species list.
- 9 An upper limit of 25.2 ppb based on environmental fate and transport simulation modeling using the linked EPA PRZM and EXAMS models. (see Section IV. C., above)

## VIII. Endangered Species

### A. Action Area

For listed species assessment purposes, the action area is considered to be the area affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. At the initial Level I screening assessment, broadly described taxonomic groups are considered and thus conservatively assumes that listed species within those broad groups are co-located with the pesticide treatment area. This means that terrestrial plants and wildlife are assumed to be located on or adjacent to the treated site, and aquatic organisms are assumed to be located in a surface water body adjacent to the treated site. The assessment also assumes that the listed species are located within an assumed area which has the relatively highest potential exposure to the pesticide, and that exposures are likely to decrease with distance from the treatment area. Section II of this risk assessment presents the pesticide use sites that are used to establish initial collocation of species with treatment areas.

If the assumptions associated with the screening-level action area result in RQs that are below the listed species LOCs, a "no effect" determination conclusion is made with respect to listed species in that taxa, and no further description of an action area is necessary. Furthermore, RQs below the listed species LOCs for a given taxonomic group indicate no concern for indirect effects upon listed species that depend upon the taxonomic group covered by the RQ as a resource.

However, in situations where the screening assumptions lead to RQs in excess of the listed species LOCs for a given taxonomic group, a potential for a "may affect" conclusion exists and may be associated with direct effects on listed species belonging to that taxonomic group or may extend to indirect effects upon listed species that depend upon that taxonomic group as a resource. In such cases, additional information on the biology of listed species, the locations of these species, fate and transport properties of the chemical, and the locations of use sites could be considered to determine the extent to which screening assumptions regarding an action area apply to a particular listed organism. These subsequent refinement steps could consider how this information would impact the action area for a particular listed organism and may potentially

include areas of exposure that are downwind and downstream of the pesticide use site.

## **B. Taxonomic Groups Potentially at Risk**

The Level I screening assessment process for listed species uses the generic taxonomic group-based process to make inferences on direct effect concerns for listed species. The first iteration of reporting the results of the Level I screen is a listing of pesticide use sites and taxonomic groups for which RQ calculations reveal values that meet or exceed the listed species LOCs. In the majority of cases, the screening-level risk assessment process reports RQ calculations for the following broad taxonomic groupings:

- Birds (also used as surrogate for terrestrial-phase amphibians and reptiles)
- Mammals
- Freshwater fish (also used as a surrogate for aquatic phase amphibians)
- Freshwater invertebrates
- Estuarine/marine fish
- Estuarine/marine invertebrates
- Terrestrial plants
- Algae and aquatic plants

### **1. Risk Quotients**

Should estimated exposure levels occur in proximity to listed resources, the available screening level information suggests a potential concern for direct effects on listed **birds, mammals, freshwater fish, freshwater invertebrates, and estuarine/marine fish** species associated with the following mancozeb use site, **ginseng**.

### **2. Probit Dose Response Relationship**

EFED assumed a probit dose response with a mean estimated slope of **4.5**. Based on this assumption, for **freshwater fish, freshwater invertebrates and estuarine/marine fish**, the estimated chance of individual mortality associated with the listed species LOC of 0.05 is **1 in 4 x 10<sup>8</sup>**. EFED recognizes extrapolation of low probability events is associated with much uncertainty in this estimate. Raw data to explore possible bounds for this estimate were unavailable.

Although there are no estuarine/marine invertebrates listed as endangered species, EFED is providing the following probability estimates in lieu of potential listing changes. EFED assumed a probit dose response with a mean estimated slope of **3.0**. The corresponding estimated chance of individual mortality associated with the listed species LOC of 0.05 for **estuarine/marine invertebrates** is **1 in 20,000**. EFED recognizes extrapolation of low probability events is associated with much uncertainty in the resulting estimates. To explore possible bounds to such estimates, EFED used the upper and lower values for the mean slope estimate (that is, **4.0** and

2.0, respectively). EFED used these slope values to calculate upper and lower estimates of the effects probability associated with the listed species LOC. These chance estimates are **1 in 1 x 10<sup>7</sup>** and **1 in 200**, respectively.

Although there are no aquatic nonvascular plants species listed as endangered species, EFED is providing the following probability estimates in lieu of potential listing changes. For aquatic nonvascular plants, EFED assumed a probit dose response with a mean estimated slope of **4.0**. The corresponding estimated chance of growth inhibition associated with the listed species LOC of 1 (that is, EEC/EC<sub>05</sub> or NOAEC for aquatic plants) for **nonvascular aquatic plants** is **1 in 20**. EFED recognizes extrapolation of low probability events is associated with much uncertainty in the resulting estimates. To explore possible bounds to such estimates, EFED used the upper and lower values for the mean slope estimate (that is, **4.6** and **3.4**, respectively). EFED used these slope values to calculate upper and lower estimates of the effects probability associated with the listed species LOC. These chance estimates are **1 in 34** and **1 in 12**, respectively.<sup>7</sup>

### 3. Implications of Sublethal Effects

EFED based bird chronic reproductive effects on reductions in: egg production; early and late embryo viability; hatchability; and offspring weight at hatch and 14-days of age in mallard ducks.

EFED based mammal chronic reproductive effects on a 2-generation study in rats. These mammal effects were parental body weight decrements, increased relative thyroid weights, and increased incidence of thyroid follicular cell hyperplasia. ETU effects triggering potential chronic risk were based on developmental defects of the brain (that is, exencephaly<sup>8</sup>, dilated ventricles, and hypoplastic cerebellum) in rats.

EFED based chronic freshwater fish effects on reduced survival and lack of growth effects in fathead minnows. Chronic freshwater invertebrate effects were due to immobility, length and time until first brood in daphnia.

### C. Indirect Effects Analysis

In conducting a screen for indirect effects, direct effects LOCs for each taxonomic group are used to make inferences concerning the potential for indirect effects upon listed species that rely upon non-listed organisms in these taxonomic groups as resources critical to their life cycle. Pesticide-use scenarios, resulting in RQs that are below all direct effect listed species LOCs for all taxonomic groups assessed are considered of no concern for risks to listed species either by direct or indirect effects.

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<sup>7</sup> EFED based the EC<sub>05</sub> on a calculated value (that is, 17.9 ppb) since a NOAEC was not established on MRID No. 43664701. EFED used the following formula:  $\text{probit } k = (\log LC_k - \log LC_{50}) * \text{slope} + \text{probit } 50\%$ ; where:  $k = 5\%$  growth inhibition and  $LC_k = 17.9$  ppb (Urban and Cook, 1986).

<sup>8</sup>

Lethal condition in which the skull is defective with the brain exposed or extruding.

The freshwater fish acute RQs exceed LOCs for mancozeb's use on ginseng (acute RQ = 0.23). At the peak *mancozeb complex* aquatic EEC expected from drift and runoff of 104.51 ppb, the likelihood of mortality effects to individual **freshwater fish** is **1 in 500**.<sup>9</sup> The freshwater invertebrate acute RQs exceed LOCs for mancozeb's use on ginseng (acute RQ = 0.18). At the peak *mancozeb complex* aquatic EEC expected from drift and runoff of 104.51 ppb, the likelihood of mortality to individual **freshwater invertebrates** is **1 in 2,500**.<sup>10</sup> The estuarine/marine fish acute RQs exceed LOCs for mancozeb's use on ginseng (acute RQ = 0.07). At the peak *mancozeb complex* aquatic EEC expected from drift and runoff of 104.51 ppb, the likelihood of mortality effects to individual **estuarine/marine fish** is **1 in 10 x 10<sup>6</sup>**.<sup>11</sup> The estuarine/marine invertebrate acute RQs exceed LOCs for mancozeb's use on ginseng (acute RQ = 9.95). There are currently no estuarine/marine invertebrates listed as endangered species. At the peak *mancozeb complex* aquatic EEC expected from drift and runoff of 104.51 ppb, the likelihood of mortality to individual **estuarine/marine invertebrates** is **1 in 1 or 100%**.<sup>12</sup> Mancozeb's ginseng use exceeded acute risk LOCs for nonvascular aquatic plants (acute RQ = 2.22). There are no nonvascular aquatic plants listed as endangered species. At the peak *mancozeb complex* aquatic EEC expected from drift and runoff of 104.51 ppb, the likelihood of reduced growth effects to individual **nonvascular aquatic plants** is **1 in 1.08 or 92%**.<sup>13</sup>

Should estimated exposure levels occur in proximity to listed resources, the available screening level information suggests a potential concern for **indirect effects** on the listed bird species: **bald eagles; brown pelicans; marbled murrelets; and Western snowy plover** associated with the following mancozeb use site, **ginseng**. Fish are a primary food source for bald eagles (both freshwater and estuarine/marine fish) and brown pelicans (mostly estuarine/marine fish). Marble murrelets' primary diet includes both freshwater and estuarine/marine fish, crustaceans and mollusks. (NatureServe, 2005). The Western snowy plover eats insects, small crustaceans, and other minute invertebrates (Terres 1980).

#### D. Critical Habitat

In the evaluation of pesticide effects on designated critical habitat, consideration is given to the physical and biological features (constituent elements) of a critical habitat identified by the U.S

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<sup>9</sup> EFED calculated this chance estimate using Individual Effect Chance Model v. 1.1 (IEC V1.1) (Odenkirchen, 2004) with an freshwater fish acute LC<sub>50</sub> = 460 ppb and a slope = 4.5.

<sup>10</sup> EFED calculated this chance estimate using IEC V1.1 with an freshwater invertebrate acute LC<sub>50</sub> = 580 ppb and a slope = 4.5.

<sup>11</sup> EFED calculated this chance estimate using IEC V1.1 with an freshwater invertebrate acute LC<sub>50</sub> = 1,600 ppb and a slope = 4.5.

<sup>12</sup> EFED calculated this chance estimate using IEC V1.1 with an estuarine/marine invertebrate acute LC<sub>50</sub> = 10.5 ppb and a slope = 3.0.

<sup>13</sup> EFED calculated this chance estimate using IEC V1.1 with a nonvascular aquatic plants LC<sub>50</sub> = 47 ppb and a slope = 4.0.



Fish and Wildlife and National Marine Fisheries Services as essential to the conservation of a listed species and which may require special management considerations or protection. The evaluation of impacts for a screening level pesticide risk assessment focuses on the biological features that are constituent elements and is accomplished using the screening-level taxonomic analysis (risk quotients, RQs) and listed species levels of concern (LOCs) that are used to evaluate direct and indirect effects to listed organisms.

The screening-level risk assessment has identified potential concerns for indirect effects on listed species for those organisms dependant upon **freshwater fish, freshwater invertebrates, estuarine/marine fish and estuarine/marine invertebrates**. In light of the potential for indirect effects, the next step for EPA and the Service(s) is to identify which listed species and critical habitat are potentially implicated. Analytically, the identification of such species and critical habitat can occur in either of two ways. First, the agencies could determine whether the action area overlaps critical habitat or the occupied range of any listed species. If so, EPA would examine whether the pesticide's potential impacts on non-endangered species would affect the listed species indirectly or directly affect a constituent element of the critical habitat. Alternatively, the agencies could determine which listed species depend on biological resources, or have constituent elements that fall into, the taxa that may be directly or indirectly impacted by the pesticide. Then EPA would determine whether use of the pesticide overlaps the critical habitat or the occupied range of those listed species. At present, the information reviewed by EPA does not permit use of either analytical approach to make a definitive identification of species that are potentially impacted indirectly or critical habitats that is potentially impacted directly by the use of the pesticide. EPA and the Service(s) are working together to conduct the necessary analysis.

This screening-level risk assessment for critical habitat provides a listing of potential biological features that, if they are constituent elements of one or more critical habitats, would be of potential concern. These correspond to the taxa identified above as being of potential concern for indirect effects and include the following: **freshwater fish, freshwater invertebrates, estuarine/marine fish and estuarine/marine invertebrates**. This list should serve as an initial step in problem formulation for further assessment of critical habitat impacts outlined above, should additional work be necessary. (US EPA, 2004a)

#### **E. Co-occurrence Analysis**

The goal of the analysis for co-location is to determine whether sites of pesticide use are geographically associated with known locations of listed species. At the screening level, this analysis is accomplished using the LOCATES database. The database uses location information for listed species at the county level and compares it to agricultural census data for crop production at the same county level of resolution. The product is a listing of federally listed species that are located within counties known to produce the crop upon which the pesticide will be used. Because the Level I screening assessment considers **both** direct and indirect effects across generic taxonomic groupings, it is not possible to exclude any taxonomic group from a LOCATES database run for a screening risk assessment. This endangered/threatened species

screen, of mancozeb's proposed use on ginseng in Washington and Oregon, has identified a potential for direct and/or indirect effects to the species listed in Table 3, below, should exposure actually occur. EFED attached the complete LOCATES results as Appendix I. Appendix I is a listing of all the endangered or threatened species considered in this risk assessment.

#### **F. Endangered and Threatened Species Assumptions, Limitations, Uncertainties, Strengths, and Data Gaps**

The LOCATES listing in Appendix I doesn't show the species associated with ginseng for the Oregon and Washington counties shown. The listing provides all the endangered or threatened species for the counties where ginseng is grown. The LOCATES database didn't allow EFED to generate a unique listing for ginseng in each county presumably because such data doesn't exist at this time.

Although listed in Appendix I, the northern spotted owl is a carnivore mainly feeding on small mammals and EFED did not include this owl in Table 3. The gray wolf was a threatened species found in some of the counties listed in Appendix I but EFED hasn't identified a direct or indirect effect from this proposed emergency use to these wolves. Gray wolves primarily feed on meat and carrion and EFED does not expect them to be impacted from mancozeb's residues on grasses, forage plants, insects, fruits, and seeds. Likewise the threatened grizzly bear was also found in some of the Washington counties in Appendix I but has been excluded from Table 3. Although bears are omnivores, EFED expects the far ranging habits of grizzly bears and the small acreage being treated in Washington (16 acres) will neutralize the potential chronic exposure risk to this species. In addition, no grizzly bears were found in the primary Washington county of treatment, Clark county, or in any Oregon counties slated for this emergency use. EFED didn't include insects listed in Appendix I. EFED does not calculate risk quotients to conduct risk assessments on terrestrial invertebrates. Mancozeb is practically nontoxic to honeybees ( $LD_{50} > 178 \mu\text{g}/\text{bee}$ ) and there have been no reported adverse effects to insects listed in Ecological Incident Information System (US EPA, 1994). Because of mancozeb's low toxicity to the surrogate insect species, honeybees, and no past reported adverse effects to insects, EFED did not include insects in Table 3. Tier I plant testing for a multiple active ingredient (a 9% mancozeb and 60% dimethomorph mixture) (MRID No. 44283401) showed all plant growth inhibition was less than 25%, negating the need for higher tier terrestrial plant testing except for possible single active ingredient mancozeb end-use products. At this time, mancozeb is considered to be a low risk to nontarget terrestrial plant species as a result of its proposed emergency use on ginseng. Because of this assumption, EFED didn't include endangered terrestrial plant species from Appendix I in Table 3. EFED is requesting studies to further evaluate the single active ingredient product risk to terrestrial nontarget plants in the mancozeb Reregistration Eligibility Document (RED) (US EPA, 2004b). Water Howellia is listed in Appendix I for several Washington counties but EFED did not include this aquatic vascular species in Table 3. EFED has not received studies to evaluate the acute risk of mancozeb's registered uses to vascular aquatic plants and is uncertain about this risk. EFED is requesting studies to evaluate this risk in the mancozeb Reregistration Eligibility Document (RED) (US EPA, 2004b).

**Table 3: Endangered or threatened species from the Oregon and Washington counties included in the Section 18 use of mancozeb on ginseng. Species listed are identified as having a potential for direct and/or indirect effects from mancozeb's use should exposure actually occur. Database source: LOCATES v. 1.2.2**

State/County	Endangered Species and/or Threatened Species
Oregon/ Lane	Birds: bald eagle; marbled murrelet; brown pelican; Western snowy plover Fish: Oregon chub; chinook salmon (upper Willamette River); coho salmon (Oregon coast population); steelhead (upper Willamette River populations)
Oregon/ Linn	Birds: bald eagle Fish: Oregon chub; chinook salmon (upper Willamette River); steelhead (upper Willamette River populations)
Oregon/ Marion	Birds: bald eagle Fish: Oregon chub; chinook salmon (upper Willamette River); steelhead (upper Willamette River populations)
Oregon/ Polk	Birds: bald eagle; marbled murrelet Fish: Oregon chub; chinook salmon (upper Willamette River); coho salmon (Oregon coast population); steelhead (upper Willamette River populations); bull trout
Oregon/ Yamhill	Fish: chinook salmon (upper Willamette River); coho salmon (Oregon coast population); steelhead (upper Willamette River populations); bull trout
Washington/ Clallam	Birds: bald eagle; marbled murrelet; brown pelican. Fish: bull trout; chinook salmon (Puget Sound); sockeye salmon (Ozette Lake population); and chum salmon (Hood Canal summer population).
Washington/ Clark	Birds: bald eagle. Fish: sockeye salmon (Snake River population); steelhead (lower; upper; and middle Columbia River; Snake River basin; and upper Willamette River populations); bull trout; chinook salmon (Snake River spring/summer run; lower and upper Columbia River); and chum salmon (Columbia River population). Mammals: Columbian white-tailed deer.
Washington/ Cowlitz	Birds: bald eagle; marbled murrelet. Fish: sockeye salmon (Snake River population); steelhead (lower; upper; and middle Columbia River; Snake River basin; and upper Willamette River populations); bull trout; chinook salmon (Snake River spring/summer run; lower and upper Columbia River); and chum salmon (Columbia River population). Mammals: Columbian white-tailed deer.
Washington/ Grays Harbor	Birds: bald eagle; marbled murrelet; brown pelican; Western snowy plover. Fish: bull trout.
Washington/ Jefferson	Birds: bald eagle; marbled murrelet; brown pelican. Fish: bull trout; chinook salmon (Puget Sound); and chum salmon (Hood Canal summer population).
Washington/ King	Birds: bald eagle; marbled murrelet. Fish: bull trout; and chinook salmon (Puget Sound).
Washington/ Kitsap	Birds: bald eagle; marbled murrelet. Fish: chum salmon (Hood Canal summer population).

**Table 3: Endangered or threatened species from the Oregon and Washington counties included in the Section 18 use of mancozeb on ginseng. Species listed are identified as having a potential for direct and/or indirect effects from mancozeb's use should exposure actually occur. Database source: LOCATES v. 1.2.2**

State/County	Endangered Species and/or Threatened Species
Washington/ Lewis	Birds: bald eagle; marbled murrelet. Fish: steelhead (lower Columbia River population); bull trout; chinook salmon (Puget Sound and lower Columbia River); and chum salmon (Columbia River population).
Washington/ Mason	Birds: bald eagle. Fish: bull trout; chinook salmon (Puget Sound); and chum salmon (Hood Canal summer population).
Washington/ Pacific	Birds: bald eagle; marbled murrelet; brown pelican; Western snowy plover. Fish: sockeye salmon (Snake River population); chinook salmon (Snake River spring/summer runs; lower Columbia River; and upper Columbia River spring run); steelhead (lower; upper; and middle Columbia River; Snake River basin; and upper Willamette River populations); and chum salmon (Columbia River population). Mammals: Columbian white-tailed deer.
Washington/ Pierce	Birds: bald eagle; marbled murrelet. Fish: bull trout; and chinook salmon (Puget Sound).
Washington/ Skagit	Birds: bald eagle; marbled murrelet. Fish: bull trout; and chinook salmon (Puget Sound).
Washington/ Skamania	Birds: bald eagle. Fish: sockeye salmon (Snake River population); steelhead (lower; middle; upper Columbia River populations and Snake River basin population); bull trout; chinook salmon (Snake River spring/summer runs; lower Columbia River; and upper Columbia River spring run); and chum salmon (Columbia River population). Mammals: Columbian white-tailed deer.
Washington/ Snohomish	Birds: bald eagle; marbled murrelet. Fish: bull trout; and chinook salmon (Puget Sound).
Washington/ Thurston	Birds: bald eagle; marbled murrelet. Fish: chinook salmon (Puget Sound).
Washington/ Wahkiakum	Birds: bald eagle; marbled murrelet; Northern spotted owl; brown pelican. Fish: sockeye salmon (Snake River population); chinook salmon (Snake River spring/summer runs; lower Columbia River; and upper Columbia River spring run); steelhead (lower; upper; and middle Columbia River; Snake River basin; and upper Willamette River populations); and chum salmon (Columbia River population). Mammals: Columbian white-tailed deer.
Washington/ Whatcom	Birds: bald eagle; marbled murrelet. Fish: bull trout; and chinook salmon (Puget Sound).

WSDA requested a total of 16 acres of ginseng be treated with mancozeb under this emergency use and specified this acreage was primarily located in Clark county but has included western Washington as the possible treatment area. According to WSU, 1999, the Washington counties

listed in the Table 3 are Washington counties where ginseng is grown. As mentioned in section **V. Aquatic Organisms Risk Assessment**, above, WSDA and ODA have provided the following direction: "Apply only when there is sustained wind away from fish-bearing waters or leave a 25 foot untreated buffer between [the] treatment area and fish bearing-waters." to protect endangered species. However, this mitigation measure was interpreted by EFED to be an unenforceable labeling statement and thus provides no added safety value aquatic organism from exposure to mancozeb. The use of "sustained wind away" is ambiguous.

## **IX. Recommended Label Restrictions**

No new modifications to label statement are recommended at this time.

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**Appendix I: (February 9, 2005) – LOCATES Version 1.2.2**  
**Oregon and Washington Species Listing by County for Ginseng Section 18 in 2005**

(no crop selection)

Minimum of 1 Acre

Status: County  
presence:

**Oregon**

County

**Lane (2953478 Acres)**

**Bird**

EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known
PELICAN, BROWN	<i>Pelecanus occidentalis</i>	Endangered	known
PLOVER, WESTERN SNOWY	<i>Charadrius alexandrinus nivosus</i>	Threatened	known

**Fish**

CHUB, OREGON	<i>Oregonichthys crameri</i>	Endangered	known
SALMON, CHINOOK (UPPER WILLAMETTE RIVER)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, COHO (OREGON COAST POPULATION)	<i>Oncorhynchus (=Salmo) kisutch</i>	Threatened	known
STEELHEAD, UPPER WILLAMETTE RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known

**Insect**

BUTTERFLY, FENDER'S BLUE	<i>Icaricia icarioides fenderi</i>	Endangered	known
BUTTERFLY, OREGON SILVERSPOT	<i>Speyeria zerene hippolyta</i>	Threatened	known

**Plant**

DAISY, WILLAMETTE	<i>Erigeron decumbens var. decumbens</i>	Endangered	known
LOMATIUM, BRADSHAW'S	<i>Lomatium bradshawii</i>	Endangered	known

**Linn (1477826 Acres)**

**Bird**

EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known

**Fish**

CHUB, OREGON	<i>Oregonichthys crameri</i>	Endangered	known
SALMON, CHINOOK (UPPER WILLAMETTE RIVER)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
STEELHEAD, UPPER WILLAMETTE RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known



**Appendix I: (February 9, 2005) – LOCATES Version 1.2.2**  
**Oregon and Washington Species Listing by County for Ginseng Section 18 in 2005**

(no crop selection)

Minimum of 1 Acre

**Oregon**

County

**Linn (1477826 Acres)**

Plant

CHECKER-MALLOW, NELSON'S	<i>Sidalcea nelsoniana</i>	Threatened	known
DAISY, WILLAMETTE	<i>Erigeron decumbens</i> var. <i>decumbens</i>	Endangered	known
LOMATIUM, BRADSHAW'S	<i>Lomatium bradshawii</i>	Endangered	known

**Marion (764860 Acres)**

Bird

EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known

Fish

CHUB, OREGON	<i>Oregonichthys crameri</i>	Endangered	known
SALMON, CHINOOK (UPPER WILLAMETTE RIVER)	<i>Oncorhynchus</i> (=Salmo) <i>tshawytscha</i>	Threatened	known
STEELHEAD, LOWER COLUMBIA RIVER POPULATION	<i>Oncorhynchus</i> (=Salmo) <i>mykiss</i>	Threatened	known
STEELHEAD, UPPER WILLAMETTE RIVER POPULATION	<i>Oncorhynchus</i> (=Salmo) <i>mykiss</i>	Threatened	known

Plant

CHECKER-MALLOW, NELSON'S	<i>Sidalcea nelsoniana</i>	Threatened	known
DAISY, WILLAMETTE	<i>Erigeron decumbens</i> var. <i>decumbens</i>	Endangered	known
LOMATIUM, BRADSHAW'S	<i>Lomatium bradshawii</i>	Endangered	known

**Polk (476251 Acres)**

Bird

EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known

Fish

CHUB, OREGON	<i>Oregonichthys crameri</i>	Endangered	known
SALMON, CHINOOK (UPPER WILLAMETTE RIVER)	<i>Oncorhynchus</i> (=Salmo) <i>tshawytscha</i>	Threatened	known
SALMON, COHO (OREGON COAST POPULATION)	<i>Oncorhynchus</i> (=Salmo) <i>kisutch</i>	Threatened	known
STEELHEAD, UPPER WILLAMETTE RIVER POPULATION	<i>Oncorhynchus</i> (=Salmo) <i>mykiss</i>	Threatened	known
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known

**Appendix I: (February 9, 2005) – LOCATES Version 1.2.2**

**Oregon and Washington Species Listing by County for Ginseng Section 18 in 2005**

(no crop selection)

Minimum of 1 Acre

		Status:	County presence:
Insect			
BUTTERFLY, FENDER'S BLUE	<i>Icaricia icarioides fenderi</i>	Endangered	known

**Oregon**

County

**Polk (476251 Acres)**

Plant

CHECKER-MALLOW, NELSON'S	<i>Sidalcea nelsoniana</i>	Threatened	known
DAISY, WILLAMETTE	<i>Erigeron decumbens</i> var. <i>decumbens</i>	Endangered	known
LOMATIUM, BRADSHAW'S	<i>Lomatium bradshawii</i>	Endangered	known

**Yamhill (459752 Acres)**

Bird

OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known
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Fish

SALMON, CHINOOK (UPPER WILLAMETTE RIVER)	<i>Oncorhynchus</i> (=Salmo) <i>tshawytscha</i>	Threatened	known
SALMON, COHO (OREGON COAST POPULATION)	<i>Oncorhynchus</i> (=Salmo) <i>kisutch</i>	Threatened	known
STEELHEAD, UPPER WILLAMETTE RIVER POPULATION	<i>Oncorhynchus</i> (=Salmo) <i>mykiss</i>	Threatened	known
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known

Insect

BUTTERFLY, FENDER'S BLUE	<i>Icaricia icarioides fenderi</i>	Endangered	known
BUTTERFLY, OREGON SILVERSPOT	<i>Speyeria zerene hippolyta</i>	Threatened	known

Plant

CHECKER-MALLOW, NELSON'S	<i>Sidalcea nelsoniana</i>	Threatened	known
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**Appendix I: (February 9, 2005) – LOCATES Version 1.2.2**  
**Oregon and Washington Species Listing by County for Ginseng Section 18 in 2005**

(no crop selection)

Minimum of 1 Acre

Status: County  
presence:

**Washington**

County

**Clallam (1141259 Acres)**

Bird

EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known
PELICAN, BROWN	<i>Pelecanus occidentalis</i>	Endangered	known

Fish

SALMON, CHINOOK (PUGET SOUND)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, CHUM (HOOD CANAL SUMMER POPULATION)	<i>Oncorhynchus (=Salmo) keta</i>	Threatened	known
SALMON, SOCKEYE (OZETTE LAKE POPULATION)	<i>Oncorhynchus (=Salmo) nerka</i>	Threatened	known
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known

**Clark (419976 Acres)**

Bird

EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known

Fish

SALMON, CHINOOK (LOWER COLUMBIA RIVER)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, CHINOOK (SNAKE RIVER FALL RUN)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, CHINOOK (SNAKE RIVER SPRING/SUMMER)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, CHINOOK (UPPER COLUMBIA RIVER SPRING)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Endangered	known
SALMON, CHUM (COLUMBIA RIVER POPULATION)	<i>Oncorhynchus (=Salmo) keta</i>	Threatened	known
SALMON, SOCKEYE (SNAKE RIVER POPULATION)	<i>Oncorhynchus (=Salmo) nerka</i>	Endangered	known
STEELHEAD, LOWER COLUMBIA RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known
STEELHEAD, MIDDLE COLUMBIA RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known
STEELHEAD, SNAKE RIVER BASIN POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known
STEELHEAD, UPPER COLUMBIA RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known
Endangered	known		
STEELHEAD, UPPER WILLAMETTE RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known

**Appendix I: (February 9, 2005) – LOCATES Version 1.2.2**

**Oregon and Washington Species Listing by County for Ginseng Section 18 in 2005**

(no crop selection)

Minimum of 1 Acre

Status: County  
presence:

**Washington**

County

**Clark (419976 Acres)**

**Mammal**

DEER, COLUMBIAN WHITE-TAILED  
WOLF, GRAY

*Odocoileus virginianus leucurus*  
*Canis lupus*

Endangered known  
Threatened known

**Plant**

HOWELLIA, WATER

*Howellia aquatilis*

Threatened possible

**Cowlitz (746443 Acres)**

**Bird**

EAGLE, BALD  
MURRELET, MARBLED  
OWL, NORTHERN SPOTTED

*Haliaeetus leucocephalus*  
*Brachyramphus marmoratus marmoratus*  
*Strix occidentalis caurina*

Threatened known  
Threatened known  
Threatened known

**Fish**

SALMON, CHINOOK (LOWER COLUMBIA RIVER)  
SALMON, CHINOOK (SNAKE RIVER  
SPRING/SUMMER)

*Oncorhynchus (=Salmo) tshawytscha*  
*Oncorhynchus (=Salmo) tshawytscha*

Threatened known  
Threatened known

SALMON, CHINOOK (UPPER COLUMBIA RIVER  
SPRING)

*Oncorhynchus (=Salmo) tshawytscha*

Endangered known

SALMON, CHUM (COLUMBIA RIVER POPULATION)

*Oncorhynchus (=Salmo) keta*

Threatened known

SALMON, SOCKEYE (SNAKE RIVER POPULATION)

*Oncorhynchus (=Salmo) nerka*

Endangered known

STEELHEAD, LOWER COLUMBIA RIVER  
POPULATION

*Oncorhynchus (=Salmo) mykiss*

Threatened known

STEELHEAD, MIDDLE COLUMBIA RIVER  
POPULATION

*Oncorhynchus (=Salmo) mykiss*

Threatened known

STEELHEAD, SNAKE RIVER BASIN POPULATION

*Oncorhynchus (=Salmo) mykiss*

Threatened known

STEELHEAD, UPPER COLUMBIA RIVER POPULATION  
Endangered

*Oncorhynchus (=Salmo) mykiss*  
known

*Oncorhynchus (=Salmo) mykiss*

STEELHEAD, UPPER WILLAMETTE RIVER  
POPULATION

*Oncorhynchus (=Salmo) mykiss*

Threatened known

TROUT, BULL

*Salvelinus confluentus*

Threatened known

**Mammal**

DEER, COLUMBIAN WHITE-TAILED  
WOLF, GRAY

*Odocoileus virginianus leucurus*  
*Canis lupus*

Endangered known  
Threatened known

**Appendix I: (February 9, 2005) – LOCATES Version 1.2.2**  
**Oregon and Washington Species Listing by County for Ginseng Section 18 in 2005**

(no crop selection)

Minimum of 1 Acre

Plant		Status:	County presence:
CHECKER-MALLOW, NELSON'S	<i>Sidalcea nelsoniana</i>	Threatened	known
<b>Washington</b>			
County			
<b>Grays Harbor (1234726 Acres)</b>			
Bird			
EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known
PELICAN, BROWN	<i>Pelecanus occidentalis</i>	Endangered	known
PLOVER, WESTERN SNOWY	<i>Charadrius alexandrinus nivosus</i>	Threatened	known
Fish			
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known
<b>Jefferson (1161131 Acres)</b>			
Bird			
EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known
PELICAN, BROWN	<i>Pelecanus occidentalis</i>	Endangered	known
Fish			
SALMON, CHINOOK (PUGET SOUND)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, CHUM (HOOD CANAL SUMMER POPULATION)	<i>Oncorhynchus (=Salmo) keta</i>	Threatened	known
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known
<b>King (1400877 Acres)</b>			
Bird			
EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known
Fish			
SALMON, CHINOOK (PUGET SOUND)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known
Mammal			
BEAR, GRIZZLY	<i>Ursus arctos horribilis</i>	Threatened	known

**Appendix I: (February 9, 2005) – LOCATES Version 1.2.2**  
**Oregon and Washington Species Listing by County for Ginseng Section 18 in 2005**

(no crop selection)

Minimum of 1 Acre

		Status:	County presence:
WOLF, GRAY	<i>Canis lupus</i>	Threatened	known
<b>Kitsap (254292 Acres)</b>			
Bird			
EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
<b>Washington</b>			
County			
<b>Kitsap (254292 Acres)</b>			
Fish			
SALMON, CHUM (HOOD CANAL SUMMER POPULATION)	<i>Oncorhynchus (=Salmo) keta</i>	Threatened	known
<b>Lewis (1559171 Acres)</b>			
Bird			
EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known
Fish			
SALMON, CHINOOK (LOWER COLUMBIA RIVER)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, CHINOOK (PUGET SOUND)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	possible
SALMON, CHUM (COLUMBIA RIVER POPULATION)	<i>Oncorhynchus (=Salmo) keta</i>	Threatened	known
STEELHEAD, LOWER COLUMBIA RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known
Mammal			
BEAR, GRIZZLY	<i>Ursus arctos horribilis</i>	Threatened	known
WOLF, GRAY	<i>Canis lupus</i>	Threatened	known
<b>Mason (621592 Acres)</b>			
Bird			
EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known
Fish			
SALMON, CHINOOK (PUGET SOUND)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, CHUM (HOOD CANAL SUMMER POPULATION)	<i>Oncorhynchus (=Salmo) keta</i>	Threatened	known

**Appendix I: (February 9, 2005) – LOCATES Version 1.2.2**

**Oregon and Washington Species Listing by County for Ginseng Section 18 in 2005**

(no crop selection)

Minimum of 1 Acre

		Status:	County presence:
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known
Plant			
HOWELLIA, WATER	<i>Howellia aquatilis</i>	Threatened	possible
<b>Pacific (597140 Acres)</b>			
Bird			
EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known

**Washington**

County

**Pacific (597140 Acres)**

PELICAN, BROWN	<i>Pelecanus occidentalis</i>	Endangered	known	
PLOVER, WESTERN SNOWY	<i>Charadrius alexandrinus nivosus</i>	Threatened		known
Fish				
SALMON, CHINOOK (LOWER COLUMBIA RIVER)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened		known
SALMON, CHINOOK (SNAKE RIVER FALL RUN)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened		known
SALMON, CHINOOK (SNAKE RIVER SPRING/SUMMER)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened		known
SALMON, CHINOOK (UPPER COLUMBIA RIVER SPRING)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Endangered		known
SALMON, CHUM (COLUMBIA RIVER POPULATION)	<i>Oncorhynchus (=Salmo) keta</i>	Threatened		known
SALMON, SOCKEYE (SNAKE RIVER POPULATION)	<i>Oncorhynchus (=Salmo) nerka</i>	Endangered		known
STEELHEAD, LOWER COLUMBIA RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened		known
STEELHEAD, MIDDLE COLUMBIA RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened		known
STEELHEAD, SNAKE RIVER BASIN POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened		known
STEELHEAD, UPPER COLUMBIA RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>			<i>Oncorhynchus (=Salmo) mykiss</i>
Endangered	known			
STEELHEAD, UPPER WILLAMETTE RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened		known
Insect				
BUTTERFLY, OREGON SILVERSPOT	<i>Speyeria zerene hippolyta</i>	Threatened		known
Mammal				
DEER, COLUMBIAN WHITE-TAILED	<i>Odocoileus virginianus leucurus</i>	Endangered		known

**Appendix I: (February 9, 2005) – LOCATES Version 1.2.2**  
**Oregon and Washington Species Listing by County for Ginseng Section 18 in 2005**

(no crop selection)

Minimum of 1 Acre

		Status:	County presence:
<b>Pierce (1081538 Acres)</b>			
Bird			
EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known
Fish			
SALMON, CHINOOK (PUGET SOUND)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known
Mammal			
BEAR, GRIZZLY	<i>Ursus arctos horribilis</i>	Threatened	known
WOLF, GRAY	<i>Canis lupus</i>	Threatened	known
<b>Washington</b>			
County			
<b>Skagit (1124349 Acres)</b>			
Bird			
EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known
Fish			
SALMON, CHINOOK (PUGET SOUND)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known
Mammal			
BEAR, GRIZZLY	<i>Ursus arctos horribilis</i>	Threatened	known
WOLF, GRAY	<i>Canis lupus</i>	Threatened	known
<b>Skamania (1077652 Acres)</b>			
Bird			
EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known
Fish			
SALMON, CHINOOK (LOWER COLUMBIA RIVER)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, CHINOOK (SNAKE RIVER FALL RUN)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, CHINOOK (SNAKE RIVER SPRING/SUMMER)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, CHINOOK (UPPER COLUMBIA RIVER SPRING)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Endangered	known



**Appendix I: (February 9, 2005) – LOCATES Version 1.2.2**  
**Oregon and Washington Species Listing by County for Ginseng Section 18 in 2005**

(no crop selection)

Minimum of 1 Acre

		Status:	County presence:
SALMON, CHUM (COLUMBIA RIVER POPULATION)	<i>Oncorhynchus (=Salmo) keta</i>	Threatened	known
SALMON, SOCKEYE (SNAKE RIVER POPULATION)	<i>Oncorhynchus (=Salmo) nerka</i>	Endangered	known
STEELHEAD, LOWER COLUMBIA RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known
STEELHEAD, MIDDLE COLUMBIA RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known
STEELHEAD, SNAKE RIVER BASIN POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known
STEELHEAD, UPPER COLUMBIA RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known
Endangered	known		
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known
Mammal			
DEER, COLUMBIAN WHITE-TAILED	<i>Odocoileus virginianus leucurus</i>	Endangered	known
WOLF, GRAY	<i>Canis lupus</i>	Threatened	known

**Washington**

County

**Snohomish (1349204 Acres)**

Bird

EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known

Fish

SALMON, CHINOOK (PUGET SOUND)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known

Mammal

BEAR, GRIZZLY	<i>Ursus arctos horribilis</i>	Threatened	known
WOLF, GRAY	<i>Canis lupus</i>	Threatened	known

**Thurston (470807 Acres)**

Bird

EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known

Fish

SALMON, CHINOOK (PUGET SOUND)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
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Plant

**Appendix I: (February 9, 2005) – LOCATES Version 1.2.2**  
**Oregon and Washington Species Listing by County for Ginseng Section 18 in 2005**

(no crop selection)

Minimum of 1 Acre

		Status:	County presence:
HOWELLIA, WATER	<i>Howellia aquatilis</i>	Threatened	possible
PAINTBRUSH, GOLDEN	<i>Castilleja levisecta</i>	Threatened	possible
<b>Wahkiakum (168184 Acres)</b>			
Bird			
EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known
PELICAN, BROWN	<i>Pelecanus occidentalis</i>	Endangered	known
Fish			
SALMON, CHINOOK (LOWER COLUMBIA RIVER)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, CHINOOK (SNAKE RIVER FALL RUN)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, CHINOOK (SNAKE RIVER SPRING/SUMMER)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
SALMON, CHINOOK (UPPER COLUMBIA RIVER SPRING)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Endangered	known
SALMON, CHUM (COLUMBIA RIVER POPULATION)	<i>Oncorhynchus (=Salmo) keta</i>	Threatened	known
SALMON, SOCKEYE (SNAKE RIVER POPULATION)	<i>Oncorhynchus (=Salmo) nerka</i>	Endangered	known

**Washington**

County

**Wahkiakum (168184 Acres)**

STEELHEAD, LOWER COLUMBIA RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known
STEELHEAD, MIDDLE COLUMBIA RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known
STEELHEAD, SNAKE RIVER BASIN POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known
STEELHEAD, UPPER COLUMBIA RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Endangered	known
STEELHEAD, UPPER WILLAMETTE RIVER POPULATION	<i>Oncorhynchus (=Salmo) mykiss</i>	Threatened	known

Mammal

DEER, COLUMBIAN WHITE-TAILED	<i>Odocoileus virginianus leucurus</i>	Endangered	known
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**Whatcom (1383586 Acres)**

Bird

EAGLE, BALD	<i>Haliaeetus leucocephalus</i>	Threatened	known
MURRELET, MARBLED	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	known
OWL, NORTHERN SPOTTED	<i>Strix occidentalis caurina</i>	Threatened	known

Fish

**Appendix I: (February 9, 2005) – LOCATES Version 1.2.2**

**Oregon and Washington Species Listing by County for Ginseng Section 18 in 2005**

(no crop selection)

Minimum of 1 Acre

		Status:	County presence:
SALMON, CHINOOK (PUGET SOUND)	<i>Oncorhynchus (=Salmo) tshawytscha</i>	Threatened	known
TROUT, BULL	<i>Salvelinus confluentus</i>	Threatened	known
Mammal			
BEAR, GRIZZLY	<i>Ursus arctos horribilis</i>	Threatened	known
WOLF, GRAY	<i>Canis lupus</i>	Threatened	known